SPIRE-UCF-MHO-002482

Herschel Observing Programmes

Matt Griffin

Science management

- **Herschel Science Management Plan is now agreed by SPC (pending some minor editorial changes)**
- **Rules for allocation of observing time are unchanged from what was presented at the last CM**
- **But the schedule has slipped – AO for Key Programmes now ~ mid-2006**

Calls for Observing Proposals

		Possible Timeline
• K:	Issue AO for 'Cycle KP' proposals	June 06 ??
• K + 3 mo:	Submission deadline for GT KP proposals	Sept. 06
• K + 6 mo:	Selection and announcement of GT KPs	Dec. 06
• K + 9 mo:	Submission deadline for OT KP proposals	Mar. 07
• K + 12 mo:	Selection and announcement of OT KPs	June 07
• K + 12 mo:	Issue AO for 'Cycle 1' GT proposals	June 07
• K + 15 mo:	Submission deadline for GT1 proposals	Sept. 07
• K + 18 mo:	Selection and announcement of GT1 progs	Dec 07
• L:	Launch	Dec. 07 ??
• L + 5 mo:	Science demonstration workshop Optimisation of selected observing progs Update of AO information	May 08
• L + 6 mo:	Issue AO for 'Cycle 1' OT proposals	Jun. 08

Calls for Observing Proposals

Possible Timeline

- L + 9 mo: Submission deadline for OT1 proposals — Sep. 08
- L + 12 mo: Selection and announcement of OT1 progs — Dec. 08
- L + 18 mo: Issue AO for 'Cycle 2' proposals — Jun. 09
- L + 21 mo: Submission deadline for GT2 proposals — Sep. 09
- L + 24 mo: Selection and announcement of GT2 progs — Dec. 09
- L + 27 mo: Submission deadline for OT2 proposals — Mar. 2010
- L + 30 mo: Selection and announcement of OT2 progs — Jun. 2010
- L + 42 mo: End of nominal Herschel mission — Jun. 2011 ??

Guidelines for KP Proposals

- Proposed guidelines formulated by M Griffin and P Barthel
- Endorsed by Science Team
- Will be updated and elaborated for the observing proposals AO, but based on the current version, proposals can be written without the need for subsequent major revision
- Detailed guidelines note will be made available ~ end July
- The following viewgraphs summarise the basic format

Format for KP Proposals

- **Proposals to be prepared using HSPOT**
- **Main proposal text to be up-loaded as a single PDF file**
  - **Max length** **15 pages (excluding references)**
  - **Typeface:** **Minimum 11 pt. (otherwise it's too** **%*#ing small)**
  - **Margins:** **> 2 cm all around**
  - **Page size:** **A4**
  - **Max. file size:** **10 MB**
  - **Figures must be interpretable in black and white**

Format for KP Proposals

Abstract (max. 250 words)

1 List of proposers and institutes

2 Science case, inc. figures and tables (max. 6 pages)

a. Scientific case for the observations proposed
b. Why Herschel is essential
c. Relation to past or future observations with other facilities
d. Outline description of proposed observations

3 Technical implementation (max. 3 pages)

a. Proposed observing modes and justification
b. Summary of observing time estimates (based on HSPOT output)
c. Special requirements or constraints
d. Data processing and analysis plan
e. Project schedule and management plan

Format for KP Proposals

4 Impact of different instrument sensitivities (max. 1 page)

5 Description of archival data products and tools that will be produced (max. 2 pages)

6 Science exploitation plan (max. 2 pages)

a. Consortium science exploitation plan
b. Foreseen use and value of the archive in the longer term

7 Outreach plan (max. 1 page)

8 References

Format for KP Proposals

Appendices:

A List of sources/fields to be observed
- To be prepared using HSPOT

B The consortium (max. 5 pages)
a. List of co-proposers and institutes involved
b. Summary of staff and other resources that will be committed to the programme
c. Consortium management/organisational structure

C Letters of support from institutes and/or agencies confirming the availability of resources

D Special TBD requirements/information for US proposals

Key Programme Data Products

- Basic guidelines and discussion note formulated by M Griffin and P Barthel
- Essential concepts endorsed by Herschel Science Team, but further clarification and discussion needed on various issues – to be addressed at future meetings
- Will be updated and elaborated for the observing proposals AO
- Following viewgraph summarises the key ideas

Key Programme Data Products

- KP consortia must undertake to deliver data products at end of the proprietary period:
  - To allow the community
    - early opportunity for direct science exploitation
    - opportunity to propose Herschel follow-up during the mission
- Starting point = data products produced by the standard processing software developed by the HSC and ICCs
- Ability to deliver data products will be a key criterion for award of KP time
- Useful software developed by KP teams is to be delivered to HSC on a best efforts basis
- It will be up to the applicants to specify in detail what they propose to provide and the benefits to the community

PACS Science Programme Status

Dieter Lutz, Albrecht Poglitsch

PACS GT definition: constraints

- PACS MOU defines proportionality of contribution to instrument and guaranteed observing time
- Scientific interests of consortium partner institutions important driver
- Responsibility of PI/CoPI and consortium to come up with a strong and coordinated GT program consistent with SMP constraints

PACS GT definition: process

- Meetings of PACS Science Team in 2000, 2003, 2004 to formulate science programme ideas and interests of partner institutions, and coordinate among institutes – reasonable overview achieved
- GT commitments of partners to observing programmes defined (some revisions possible in finalization of programmes)
- Coordination groups established to achieve detailed coordination of projects, different coordination modes possible: shared, combined, separate

PACS GT definition: process (2)

- Major fraction in coordinated key programmes
- PACS internal deadline Nov. 30 2004 for first worked-out proposals, some further internal coordinations since then.
- Ready for coordination ‘splinters’ with SPIRE and HIFI representatives

PACS draft KP proposals

Eight GT Key programme proposals

- Galactic (Gould Belt) survey (Andre et al.) 170h
- Earliest Phases of Star Formation (Henning et al.) 125h
- Birth of high Mass Stars (Zavagno et al.) 20h + SPIRE
- Environment of post- main sequence objects (Groenewegen, Kerschbaum et al.) 187h
- ISM in low metallicity environments (Madden et al.) 30h+SPIRE
- Infrared bright galaxies at z<1 (Sturm et al.) 180h
- Extragalactic surveys (Lutz et al.) 570h
- Individual high-z objects (Stickel et al.) 170h

~ 70% of PACS GT in these projects, rest in reserve or intended for 'normal' GT proposals

Topics for Discussion

Overall quality of the GT science Programme

Questions about rules and regulations

Formulation of the plan Science Team plan

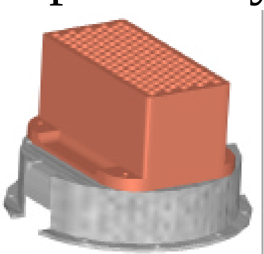
Approach to collaborations


BLAST -
Kiruna 2005
University of Pennsylvania
Brown University
University of Miami
JPL
University of Toronto
University of British Columbia
INAOE – Mexico
Cardiff University

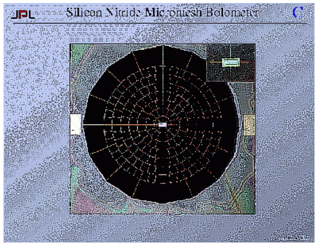
BLAST Telescope and Detector Parameters

Telescope:	Temperature	300K (230K for North American flight
	Used diameter	1.9 m (secondary mirror is pupil stop)
Detectors:	Bolometer optical NEP	3.0×10^{-17} W Hz $^{-0.5}$
	Throughput for each pixel	$A\Omega = \lambda^2$ ($2f\lambda$ feed horns)
Bolometers:	Central Wavelengths	250 350 500 microns
	Number of Pixels	149 88 43
	Beam FWHM	30 41 59 arcseconds
	Background Power	25.6 18.3 13.5 pW
	Field of view for each array	6.5 x 13 arcminutes
	Overall instrument transmission	30%
	Filter widths ($\lambda/\Delta\lambda$)	3
	Observing efficiency	90%

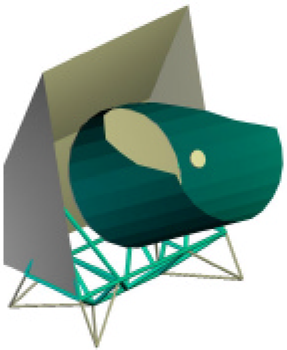
Compact arrays



State-of-the-art detectors

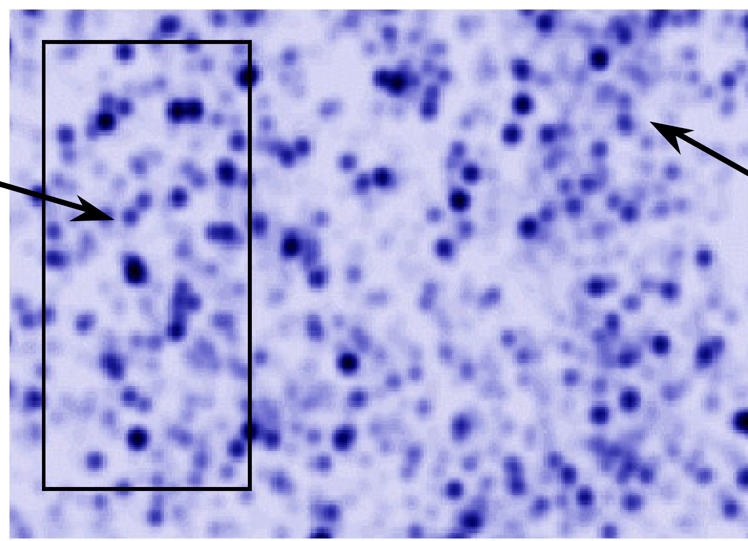


High-altitude telescope



Projected performance

	250 mm	350 mm	500 mm
Background power pW Ösec	**25.6**	**18.3**	**13.5**
Background limited NEP W Hz $^{-0.5}$ x 10^{-17}	**20**	**14**	**10**
NEFD mJy Ösec	**236**	**241**	**239**
DS (1s, 1hr) (1 sq. deg.) mJy	**38**	**36**	**36**
DS (1s, 6hr) (1 sq. deg.) mJy	**15.5**	**14.7**	**14.6**
SCUBA (average NEFD) mJy Ösec	**-**	**1100**	**1000**
SOFIA (calculated NEFD) mJy Ösec	**550**		



Science goals

Galactic and extragalactic *BLAST* surveys will:

(i) identify large numbers of high-redshift galaxies;

(ii) measure photometric redshifts, rest-frame FIR luminosities and star formation rates thereby constraining the evolutionary history of the galaxies that produce the FIR–submillimeter background;

(iii) measure cold pre-stellar sources associated with the earliest stages of star and planet formation;

(iv) make high-resolution maps of diffuse galactic emission over a wide range of galactic latitudes.

50 hour 250 μm LDB Survey Strategies

Galaxy Counts

Survey Area (sq. deg)	**1 s depth mJy**	**# of pixels**	**# of Gal. > 5 s**	**# of Gal. > 10 s**	**# of 5 s Gal. Z > 1**	**# of 5 s Gal. Z > 3**
1.0	**5**	**18334**	**835**	**265**	**765**	**147**
2.0	**7**	**36668**	**1012**	**291**	**927**	**151**
4.0	**10**	**73336**	**1100**	**294**	**988**	**147**
36	**30**	**660024**	**990**	**246**	**895**	**105**

The depth of the surveys can be adjusted to address different science goals.

The number of galaxies detected at 5 s will be more than 20 times the total number of 5 s sources detected by SCUBA in the last 4 years.

Kiruna flight campaign summary

- Monday 6th June – BLAST declared flight ready
- Flight observing plan agreed – good mix of galactic & extra-galactic fields
- 12th June, 3.05am – BLAST launches

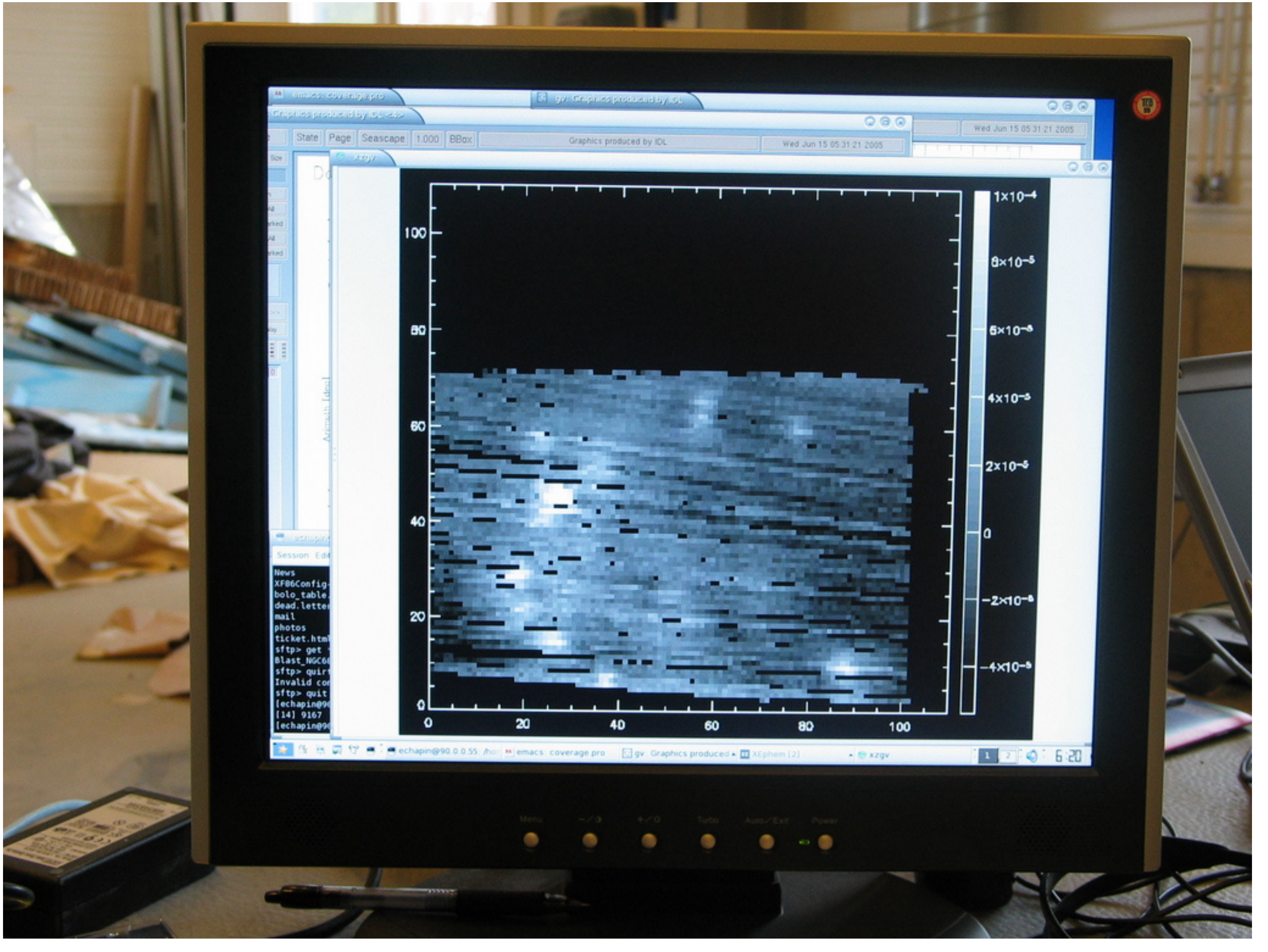
BUT…..

- Very cold ascent - -59C through tropopause
- DAS bias board packed up. Recovered after two nervous hours by pointing electronics at sun.
- Initial beam scans were very strange – beam scan of Jupiter was described over the ‘phone as a doughnut.
- Beam eventually recovered, but remained non-Gaussian, and approx 1.8’ at 500μm (c.w. 59”)
- Observing plan rapidly modified – concentrated mainly on galactic sources – many maps of a few. Evolved throughout flight.

Observations

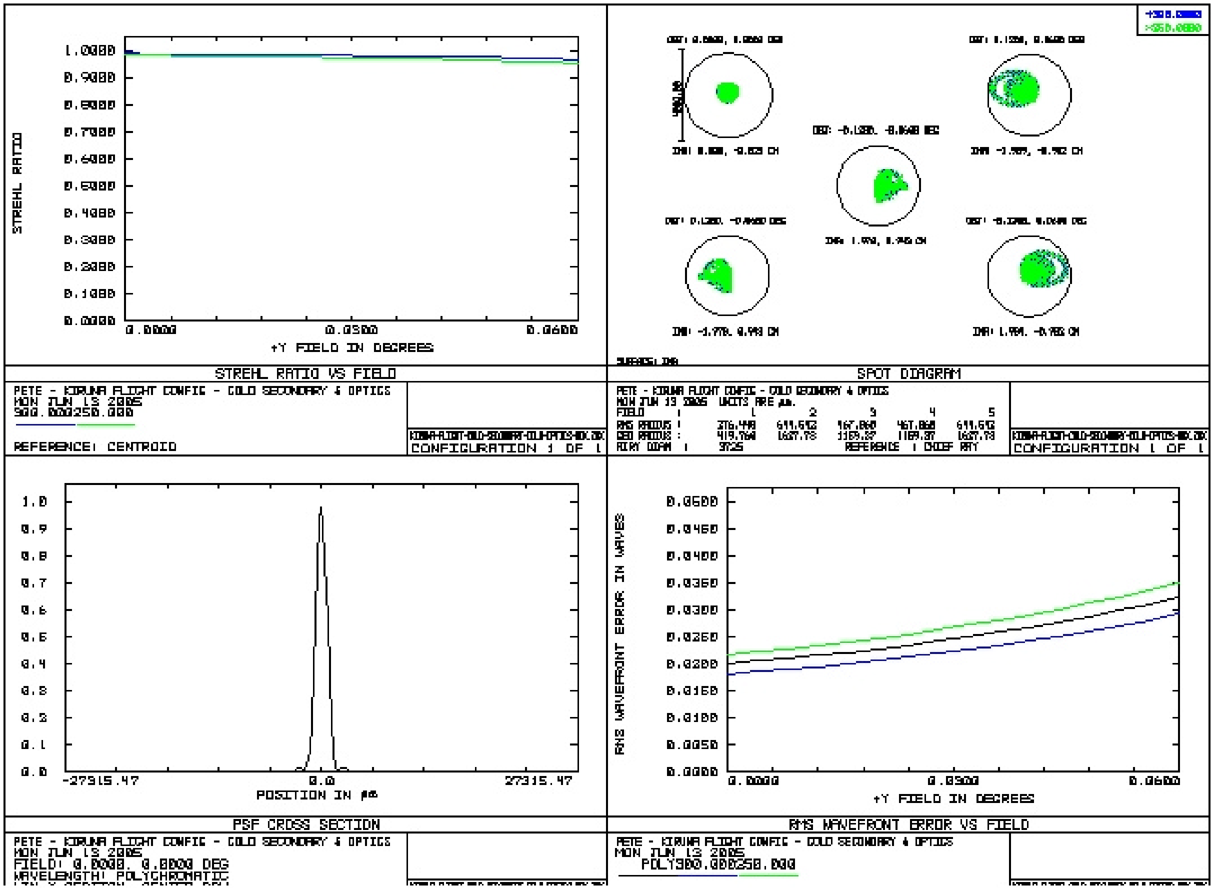
•L5B_1 – Galactic sources
•CRL2688 – Egg nebula – JCMT secondary calibrator
•Arp220 – ULIRG starburst – flux calibrator
•Cygnus X-1 – molecular dust cloud & compact HII regions
•IC5146 – Cocoon nebula – Star-forming region
•MRK231 – ULIRG powered by AGN
•IVCG86 – high-latitude molecular cloud in Draco – lots of cirrus
•Pallas – Well-understood asteroid - calibrator
•W75N – Molecular outflow source & SF region
•GRSMC45 – SF region – “The Filament”
•N1_HVCA – Elais N1 – high velocity cloud region – potential new cirrus foreground component – relevant to SPIRE surveys.
•K3-50 – compact HII region
•IR20126 – compact molecular outflow from massive protostar (IRAS20126)

First map – lossy compression, one scan, one detector!



Optics problems

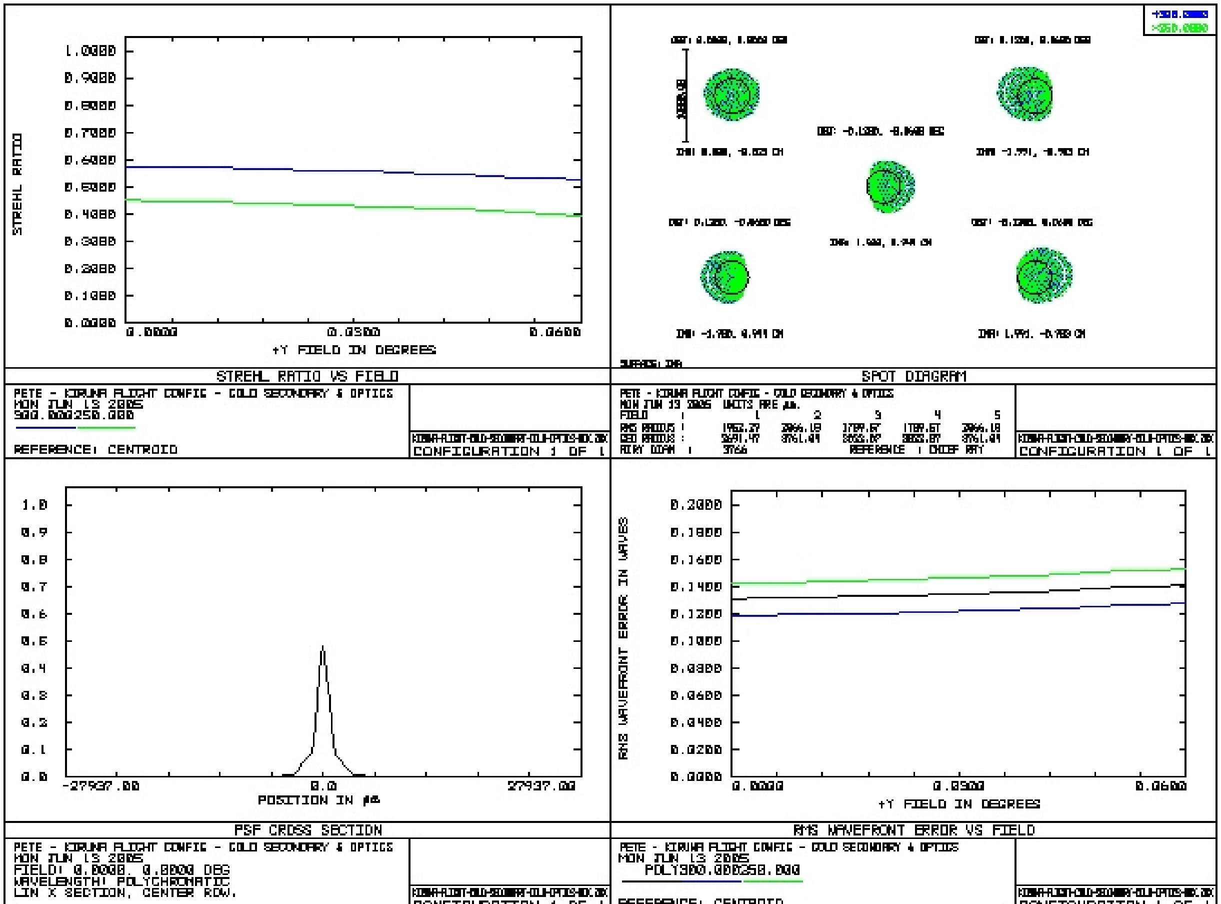
- Modelled thermal effects on telescope – negligible
- Primary – secondary distance would need to shift by ~2mm to replicate effect.



Nominal, corrected for float temperatures

Optics problems

- Modelled thermal effects on telescope – negligible
- Primary – secondary distance would need to shift by ~2mm to replicate effect.

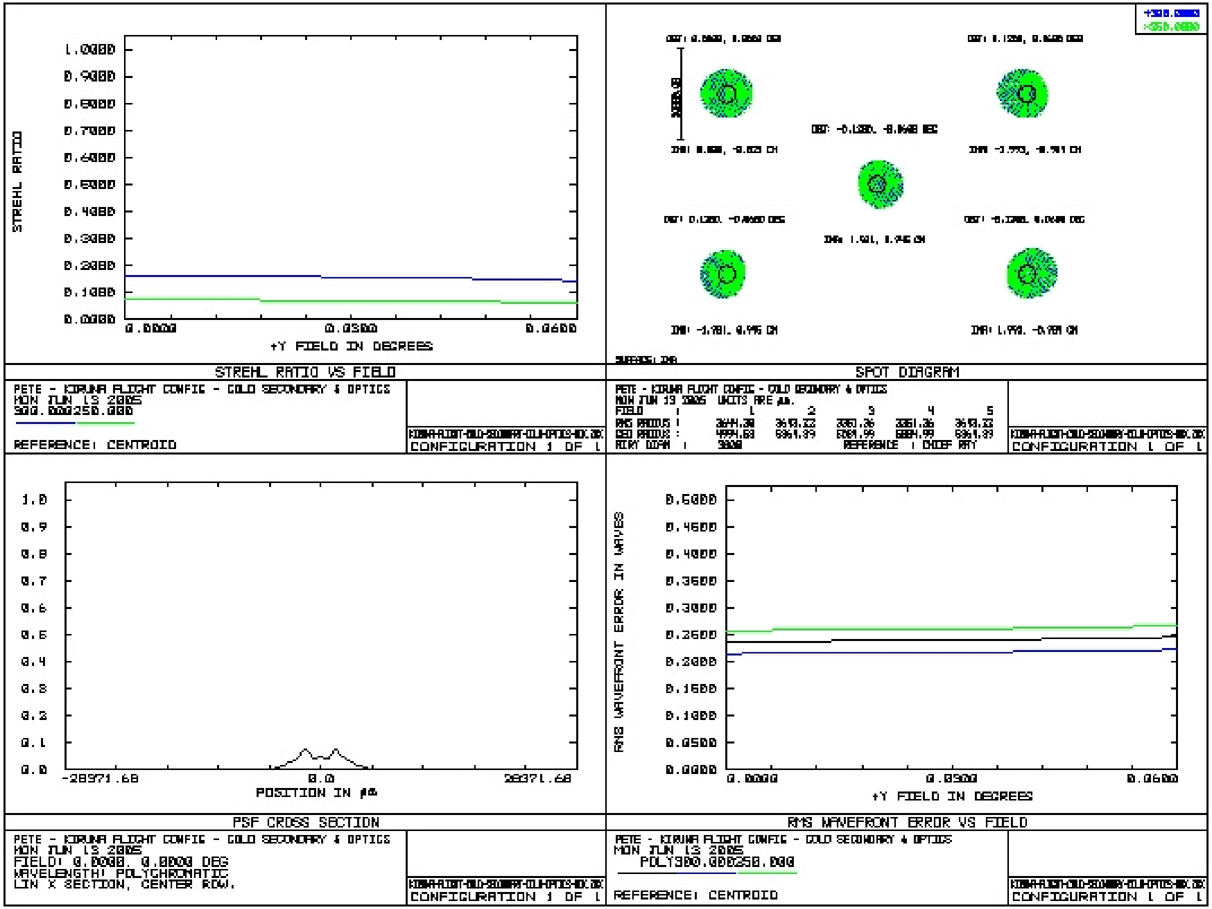


Modelled for 1mm secondary offset

Optics problems

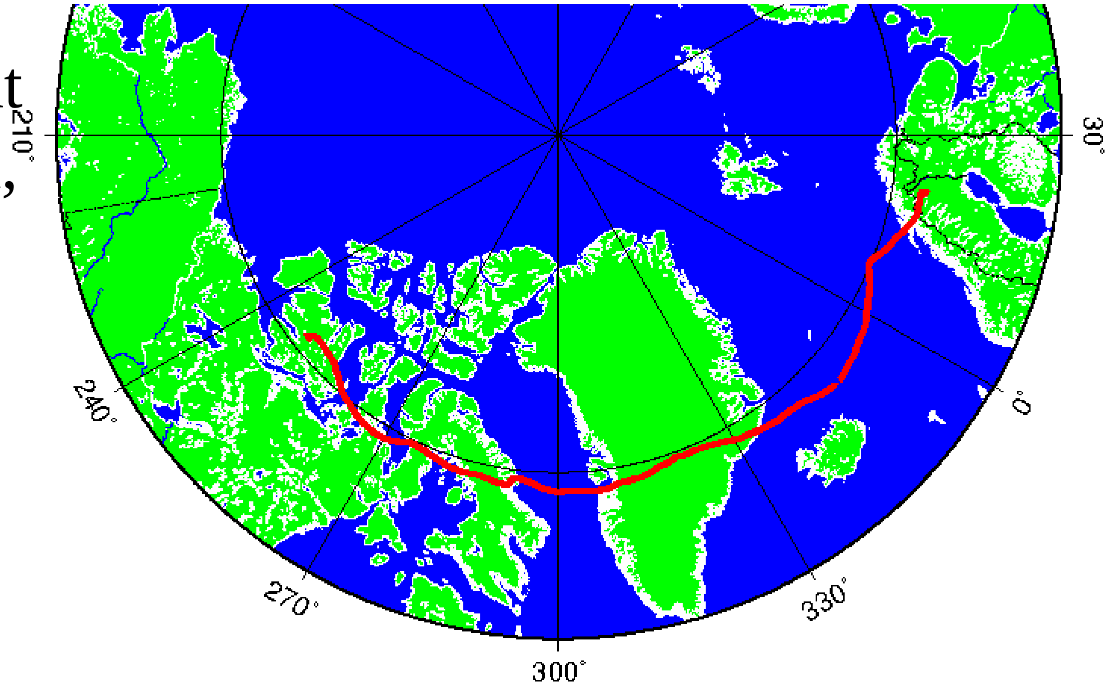
•Modelled thermal effects on telescope – negligible

•Primary – secondary distance would need to shift by ~2mm to replicate effect.



Modelled for 2mm secondary offset

- Flight terminated 16th June after 5 days at float.
- Landed on Victoria Island – recovery assisted by bear spotters.
- Minor damage – bent leg, lost GPS antenna, battery shorted etc



Interesting statement from recovery team:

"The secondary mirror support structure is obviously damaged. When I lift it, it moves from its base. I can not diagnose this any more than to say that it is loose. I assume that this happed on impact/chute shock, but who knows."

What now?

- Optics meeting being arranged for early August
  - Decide on telescope options & investigation of Kiruna flight
- Prepare for LDB Antarctic flight in ~18 months
- NASA proposal in to upgrade BLAST to BLAST-POL
  - Need good understanding of polarisation of foregrounds for WMAP & Planck
- More info:-

"The balloon-borne large aperture sub-millimeter telescope" Advances in Space Research, Volume 33, Issue 10, 2004, Pages 1793-1796

"The Balloon-Borne Large Aperture Submillimeter Telescope (BLAST)", Proc. SPIE vol. 5498 p. 42-54

http://chile1.physics.upenn.edu/blastpublic/index.shtml

SAG1 Splinter Summary

Extragalactic Surveys

Jamie Bock
Seb Oliver

The SAG1 Program

	PACS			SPIRE	
	Area [sq. deg]	Time [hr]	Depth [hr/sq.deg]	Time [hr]	Depth [hr/sq.deg]
PofD 1	0.11	23	209		
PofD 2	1			100	100
SFR 1	0.13	18	138	7	54
SFR 2	0.68	75	110	20	29
SFR 3	2.68	129	48	74	28
LSS	19			520	27
SFR 4	11.5	27	2.3	132	11.5
SFR 5	50	108	2.2	115	2.3
WIDE	100			200	2.0
Clusters 1a		60		60	
Clusters 1b				48	
Total		440		1276	
Grand Total	1716		Allocation	850	50%

Including efficiencies and assuming PACS time contributed, this all fits into 850 hours.

SPIRE/PACS Joint Observations (1)

Q: Do we combine with PACS or go it alone?

+ a unified survey maximizes Herschel science
+ more observatory time overall
+ going it alone requires dropping programs
- collaboration logistics (data rights, fields, publications)

In the case of PACS… there is a formula for authorship based on the amount of contributed instrument time

Nominal Survey Plans

SPIRE
(uncompressed)

	PACS			SPIRE	
	Area [sq. deg]	Time [hr]	Depth [hr/sq.deg]	Time [hr]	Depth [hr/sq.deg]
PofD 1	0.11	23	209		
PofD 2	1			100	100
SFR 1	0.13	18	138	7	54
SFR 2	0.68	75	110	20	29
SFR 3	2.68	129	48	74	28
LSS	19			520	27
SFR 4	11.5	27	2.3	132	11.5
SFR 5	50	108	2.2	115	2.3
WIDE	100			200	2.0
Clusters 1a		60		60	
Clusters 1b				48	
Total		440		1276	
Grand Total	1716		Allocation	850	50%

PACS

Clusters?
Follow-up plans?

	PACS			SPIRE	
	Area [sq. deg]	Time [hr]	Depth [hr/sq.deg]	Time [hr]	Depth [hr/sq.deg]
PACS 1	0.07	91	1300		
PACS 2	0.19	120.1	632		
PACS 3	5.5	291.5	53		
PACS Clusters		?			
Clusters 1b					
Total		503			
Grand Total	503		Allocation	500	99%

SPIRE/PACS Joint Observations (2)

A: We will attempt to combine with PACS for the deep tiers

Actions: Write an MOU for October 2005
- Define SPIRE EG data rights and publication policy
- A tiered approach for science rights in joint fields

Define PACS science, SPIRE science
Joint programs: bolometric luminosities
follow-up (PACS positions)

Data become public 1-year after

Field Selection

Q: What fields do we use?

	Area [sq. deg]	Field
PACS 1	0.07	GOODS-S
PACS 2 a	0.06	GOODS-S
PACS 2 b	0.06	GOODS-N
PACS 2 c	0.06	?
PACS 3 a	1	SXDF
PACS 3 c	1	COSMOS
PACS 3 d	1	Lockman (which?)
PACS 3 e	1	CDFS
PACS 3 f	1	Grooth

Mapping Speed 0.6	Area [sq. deg]	Fields [sq. deg]	Commen
SFR 2 / PofD2	0.5	Lockman?	Which?
SFR 3	1	Lockman?	Which?
LSS / SFR 4	10	XMM/Lockman	Lose 1 sq. deg
SFR 5 / Wide	10	Lockman/XMM	Lose 1 sq. deg
6 fields @ 7	7	ELAIS N1	
or	7	ELAIS S1	
5 fields @ 7.5	7	CDFS	Lose 1 sq. deg
	7	SA22	No Spitzer

Q: What is the optimal combination of area and depth to satisfy the (many) science goals of a cohesive survey?

Program Definition

Some options exist which fit into observing time.
Need to lay out several survey options including area and field to present to the overall SAG for discussion and eventual decision

- Some options may remove entire programs
- Surveys may serve as pilots for larger OT surveys
  - Extra-HOT
  - Shallow
  - Large cluster survey
- Will require input from individual proposal leaders to assess compromises on science
- Goal is to have a unified program defined
- Issue is coupled with PACS MOU

SAG2: low-z extragalactic

Coordinators: Sue Madden

& Walter Gear

Summary of 2004 Proposals

- ISM in low-metallicity galaxies – 161 hours (SPIRE, PACS & HIFI)
- ISM in very nearby galaxies – 176 hours (SPIRE, PACS &HIFI)
- Volume-limited reference survey – 123 hours (SPIRE only)
- AGN/starburst complete sample – 142 hours (SPIRE & PACS)
- TOTAL REQUEST 602 hours

Co-I’s Allocation to SAG 2

- 300 hours !!

SAG2 reaction to allocation

- With regret, the AGN/starburst complete sample programme was dropped and will probably go forward as OTKP
- Remaining 3 programmes (460 hrs vs 300) revisit sample & observing strategies
- Negotiate with PACS & HIFI GT holders to combine programmes & reduce SPIRE GT required
- Agreement on baseline allocation of 100 hours of SPIRE GT to each of the 3 programmes

I: Volume-Limited Galaxies Survey: Science Motivation

- Provides a statistical submm survey of the nearby universe
  - How dust content (mass, distribution) depend on galaxy types and environment
  - Relate the dust properties to other tracers of the ISM (molecular gas, atomic gas, X-ray emitting gas)
  - Zero redshift reference sample for High-z studies
- Sample selection
  - Tully's Nearby Galaxies Catalogue
  - $10\ \mathrm{Mpc} < d < 25\ \mathrm{Mpc}$: far enough for single SPIRE pointing & to include ellipticals; close enough for spatial resolution
  - Spans all Hubble types

I: Volume-limited Survey

- Curtailed sample selection slightly, from ~400 objects to ~350
- Maintain integration time per object & hence dust mass sensitivity
- Hence reduce from 123 to ~ 100 hours GT with SPIRE *only*...

II: Physical Processes in Galaxies of the Local Universe: Science Motivation

A small selection (currently 15) of resolved nearby galaxies observed in detaill in FIR & submm gas and dust properties

- bridge the gap between Milky Way and high redshift
- ISM physics,i.e. heating, cooling
- star formation interplay with ISM with conditions spanning a wide range of SF activity, morphology, luminosity & metallicity
- variations inside a galaxy as well as global properties

II: Nearby Galaxy Sample

- Considerable overlap in sample list with PACS GTKP
- BUT....they are mostly interested only in multi-line spectroscopy of nuclear regions rather than global properties
- In principle ~40 hours of overlap if collaboration and data rights agreement can be managed....OR we wait 12 months to access the data
- HiFi have proven very difficult to communicate with let alone negotiate....
- Now v. close to fitting within 100 hours SPIRE GT

III: Dwarf Galaxies   Science Motivation

1. Nature of dust in low metallicity environments?
   – Dust size distribution? Dust spatial distribution?
2. Consequesces on the heating and cooling?
3. What galactic properties and processes control the dust properties?
   – How to disentangle effects of ISM structure, radiation field/star formation activity and metallicity in the SED?
4. Impact of dust abundance and composition on the evolution of the ISM?
5. The ISM and SF in truly primordial galaxies

III: Dwarf Galaxies

- 20 hours of PACS GT definitely committed
- => need to reduce a further 30 hours
- Don't want to drop lowest metallicity sources
- Will probably reduce number of intermediate metallicity sources to fit within 100 hours of SPIRE GT (45 compact galaxies down to ~30)
- UNLESS we can get some extra time from HiFi……

Potential Open Time KPs

1) PACS and SPIRE survey of Elliptical Galaxies
- P.I. Manfred Stickel

2) PACS + SPIRE survey of Virgo Cluster Galaxies
- P.I. Alessandro Boselli

3) PACS + SPIRE survey of AGNs/Starbursts
- P.I. Luigi Spignolio

4) Herschel survey of the LMC/SMC
- P.I. Unconfirmed

(A follow up of the Spitzer survey)

SAG 3 Proposals for GT Key Projects

• ***Probing the origin of the stellar IMF*** (**Gould Belt** survey)
Wide-field (~140 deg^2) photometric imaging of nearby (d < 0.5 kpc) molecular clouds **Requested : 249 hr** ~ **Allocated : 235 hr**

• ***The birth of high-mass stars*** (**OB star formation** survey)
Multi-band imaging survey of high-mass star-forming complexes at intermediate (d < 3 kpc) distances
Requested (Stage 2) : 110 hr > **Allocated : 85 hr**
⟶ OB star formation survey area reduced to ~ 20 deg^2

SAG 3 Total Time Allocation : 320 hr = 235 +85 hr of SPIRE GT

Two Unified SPIRE/PACS GT Key Projects

Envisaged Collaborations and Time Contributions

- ***Probing the origin of the stellar IMF*** (**Gould Belt** survey)

Joint SPIRE/PACS GT KP with 252 hr of SPIRE GT + 170 hr of PACS GT :

- 235 hr of SPIRE GT from SAG 3
- 17 hr of SPIRE GT from SAG 4 (18 h of SPIRE + 16 h of PACS common)
- 70 hr of PACS GT from CEA Saclay
- 70 hr of PACS GT from IFSI Rome
- 20 hr of PACS GT from KU Leuven
- 10 hr of PACS GT from MPIA Heidelberg

\+ Potential additional contribution of up to ~ 60 hr from HSC

- ***The birth of high-mass stars*** (**OB star formation** survey)

Joint SPIRE/PACS GT KP with 85 hr of SPIRE GT + 20 hr of PACS GT :

- 85 hr of SPIRE GT from SAG 3
- 20 hr of PACS GT from OAMP Marseille

Plans for data/publication rights

Summary of Proposed Constitution for the Gould Belt KP

- **Data/publication rights** relative to the SPIRE and PACS data from the project governed by the rules of the SPIRE and PACS consortia, respectively
- **SPIRE data** owned by SAGs 3 & 4 with data/publication rights according to the SPIRE constitution
- **PACS data** owned by CEA Saclay, IFSI Rome, INAF Arcetri, KU Leuven, MPIA Heidelberg according to distribution of fields given in the proposal, with corresponding publication rights
- Special agreement between SAG 3, SAG 4, and CEA Saclay for the PACS data in Taurus and Polaris flare
- **Collaborations** between the SPIRE and PACS sub-teams owning/working on the SPIRE and PACS data of a particular region are strongly encouraged
- In the context of such bi-lateral collaborations, access to the SPIRE or PACS data of a given region may be given to participants involved in the analysis of other data from the project on the same region

Preliminary Distribution of Responsibilities for the PACS Survey of Nearby Molecular Clouds

Table 1: **Preliminary list of fields to be surveyed with PACS (assuming a maximum scanning speed of 6″/sec) and distribution of responsibilities among the participating PACS institutes**

Cloud complex	Area (deg^2)	Distance (pc)	IRAS B_{100} (MJy/sr)	(1σ) Cirrus Noise at 170μm (mJy/beam)	(10σ) Mass Sensitivity[a] ($M_\odot$)	Required Time (hr)	Main Responsibility
Taurus	1.0	140	35	4	0.015	10.6	France ?
Ophiuchus	2.5	140	80	14	(0.015)	26.6	France ?
Polaris flare	0.5	150	10	0.5	0.015	5.5	France ?
Lupus	1.0	100	50	7	0.007	10.6	Italy/Belgium ?
Coalsack	1.0	150	150	35	(0.015)	10.6	Italy/MPIA ?
Chamaeleon I/III	1.5	160	20	2	0.02	16.0	Belgium ?
Corona Australis	0.5	170	30	3	0.02	5.5	MPIA ?
Serpens	1.0	260	70	11	(0.05)	10.6	Italy ?
Perseus	2.0	300	35	4	0.06	21.3	Italy ?
Orion (A+B)	5.0	450	75	13	(0.14)	53.2	Italy/France ?

Suggested Preliminary Distribution of Coordinating Subteams for the 'Gould Belt' KP

Table 1: **Fields to be surveyed with SPIRE and suggested coordinating teams**

Cloud complex	Area (deg^2)	Distance (pc)	(1σ) Cirrus Noise at 250μm (mJy/beam)	Required $rms_{250\mu}$ (mJy/beam)	(10σ) Mass Sensitivity[1] ($M_\odot$)	Required Time (hr)	Coordinating Team within SAG 3
Taurus	20	140	10	20	0.02	19.5	Saclay/Cardiff ?
Taurus	5	140	10	10	0.01	19.5	Saclay/Orsay ?
Ophiuchus	10	140	35	20	0.02	9.7	Saclay/Cardiff ?
Pipe Nebula	3	140	35	20	0.02	2.9	Saclay ?
Polaris flare	4	150	3	10	0.01	15.6	Saclay/Orsay ?
Lupus	3	100	15	20	0.01	2.9	Rome ?
Coalsack	1.5	150	90	20	0.02	1.5	Rome ?
Cham I/III + Musca	4	160	5	10	0.01	15.6	Canada/Orsay ?
Corona Australis	3	170	10	10	0.01	11.7	Cardiff/Rome ?
Serpens/Aquila Rift	25	260	30-90	20	0.07	24.3	Rome/Saclay ?
Perseus	4	300	5-15	10	0.04	15.6	Rome ?
IC 5146	1	400	25	20	0.15	1.0	Canada/Rome ?
Cepheus flare	20	440	5	20	0.2	19.5	Cardiff/Canada ?
Orion (A+B)	20	450	20	20	0.2	19.5	Rome/Saclay ?

Suggested Distribution of Coordinating Subteams for the 'OB Star Formation' KP

Table 1: **Massive molecular cloud complexes proposed for imaging and suggested coordinating teams**

Molecular complexes	D (kpc)	Gas mass ($M_{\odot}$)	$A_V > 10$ area (deg^2)	$\sigma_{250\mu m}$[a] (mJy)	ALMA vis.	Coordinating Team
Vela	0.7	$> 5 \times 10^5$	4	40	Y	Rome / Canada ?
Mon OB1 /Mon R2	0.8	2.5×10^5	1	30	Y	Cardiff / Saclay / Canada ?
Cygnus X	1.7	4×10^6	4.5	100	N	Saclay / Cardiff ?
M16/M17 /Sh40	1.7	1.5×10^6	3	$< 1\,000$	Y	Saclay / Canada ?
NGC 6334 /6357/6231	1.7	1.3×10^6	2	$< 1\,000$	Y	Rome / Saclay ?
W3/W5 /KR140	2.2	2×10^5	1	10	N	Rome / Canada / Cardiff ?
NGC 7538	2.8	1×10^6	1.5	25	N	Canada / Saclay ?
W48	3.0	5×10^6	3	< 400	Y	Saclay / Rome ?

"Probing the origin of the IMF" by the SPIRE consortium (SAG 3). Estimates are very uncertain for regions in the Galact
(see Sect. 5.1). The cirrus noise level at 170 μm is expected to be a factor of ~ 2 lower.

Plans for Production of Stage-3 Proposals

Next steps to produce two unified SPIRE/PACS proposals:

- Combine the existing SPIRE and PACS proposals of the Gould Belt survey into a single, unified SPIRE/PACS proposal (~ same science case)
- NB: Combination already done for the 'OB star formation' project - Draft combined proposal circulated within SAG 3 at the end of March 2005
- Finalize the detailed definition of the SPIRE/PACS fields to be mapped in the various star-dorming complexes covered by the two surveys
- Require robust/calibrated extinction maps and refined estimates of the cirrus noise level in the target clouds
- Agree on 'final' versions of the projects' constitutions and distributions of coordinating sub-teams for inclusion in the two proposals (« Exploitation plan/ team organisation » section)

SAG 4 (ISM)

Alain Abergel, Jean-Paul Baluteau

1 Key Project: “Evolution of interstellar dust“

Last consortium meeting: 195 hours requested, 180 hours allocated

Progress Report :

- Observing program
- Spitzer observations
- Discussions with HIFI and PACS

1 Open Time Key Project: “The Galactic Centre: A SPIRE FTS Survey”

Coordination: Glenn White and Bruce Swinyard

200 hours, 1/3 square degree

Evolution of interstellar dust

- **Unbiased survey with different :**

  Av, Illumination, Density, History, Star forming activity

- **Combination of Mapping and Spectroscopy**

  Dust SED : Continuum

  Physical conditions : CI, CII, OI, high-level lines of CO.

Relative contribution of all processes acting on the dust particles :

Fragmentation / Coagulation / Condensation / Evaporation / Photo-processing

… **in all interstellar environments :**

- Most diffuse regions
- Cirrus, Molecular Clouds
- PDRs
- Pre-stellar cores and protostars

Selected targets in nearby regions,
with precise physical conditions and simple geometry

Evolution of interstellar dust : Observing Program

Source types	SPIRE Mapping deg^2, 1σ, hours	PACS Mapping deg^2, 1σ, hours	SPIRE LR N, hours	SPIRE HR N, hours	PACS HR N, hours	HIFI HR hours
Shock pr. dust	1.8, 10 mJy, 8 h	0.45, 7 mJy, 8 h				
Cir-Mol. Cl.	5.05, 10 mJy, 21 h	0.7, 7 mJy, 12 h	1, 10 h		1, 2 h	
PDRs	0.12, 10 mJy, 1 h	0.12, 7 mJy, 3 h	12, 20 h	36, 36 h	36, 18 h	
Hot PDRs	1.8, 15 mJy, 2 h			12, 12 h	PACS LAM	
Pre-stellar c.			12, 9 h			12 h
Cl. 0 protost.			12, 3 h	12, 12 h		
Cl. I protost.			12, 3 h	12, 12 h		
Total (hours)	32 h (18 common)	23 h (+16 PACS/CEA)	45 h	72h	20h	12h

Total = 204 h SPIRE KP - 9 h + 8 h = 203 hours

- SPIRE : 73 % : 16 % Mapping, 57 % Spectroscopy
- PACS : 21 % : 11 % Mapping, 10 % Spectroscopy
- HIFI : 6 % : Spectroscopy
- TOTAL : 27 % Mapping and 73 % Spectroscopy

Evolution of interstellar dust : Observing Program

Source types	SPIRE Mapping deg^2, 1σ, hours	PACS Mapping deg^2, 1σ, hours	SPIRE LR N, hours	SPIRE HR N, hours	PACS HR N, hours	HIFI HR hours
Shock pr. dust	1.8, 10 mJy, 8 h	0.45, 7 mJy, 8 h				
Cir-Mol. Cl.	5.05, 10 mJy, 21 h	0.7, 7 mJy, 12 h	1, 10 h		1, 2 h	
PDRs	0.12, 10 mJy, 1 h	0.12, 7 mJy, 3 h	12, 20 h	36, 36 h	36, 18 h	
Hot PDRs	1.8, 15 mJy, 2 h			12, 12 h	PACS LAM	
Pre-stellar c.			12, 9 h			12 h
Cl. 0 protost.			12, 3 h	12, 12 h		
Cl. I protost.			12, 3 h	12, 12 h		
Total (hours)	32 h (18 common)	23 h (+16 PACS/CEA)	45 h	72h	20h	12h

Total = 204 h SPIRE KP - 9 h + 8 h = 203 hours

- SPIRE GT coming from SAG 3= 9 hours
- PACS GT CEA: 16 hours: 8 hours to be paid by SAG 4

Actually 203 hours: no problem to reduce to the allocation of 180 hours

Source	I_{100}[1]	A_V	Physical Properties			Obs[2].
Shock processed dust			n_H, H cm^{-3}	v, km s^{-1}	HI/CO[3]	deg^2, N
Spica H II	1-4	0.1	0.5	0	n/n	0.9, 0
IVC G86.5+59.6	1-2	0.1	10	-40	y/n	0.9, 0
Cirrus to Molecular Clouds			α[4]	f_{CO}[5]		
Ursa Major	4-8	< 1	100	0.	y/y	1.5, 0
Polaris flare	5-10	0.3-2	10	0.3	y/y	1.5, 0
G300-17/Cham III	8-18	1-3	2/5	0.1/1	n/y	1.3, 0
Taurus filament	10-20	1-3	1	1	n/y	0.75, 0
PDRs		d (pc)	T_{eff}(K), star	G_0[6]	Geometry[7]	arcmin^2, N
NGC7023	1000	440	17,000, B3Ve	1500	E-O	16, 3
NGC7023 E	200	440	17,000, B3Ve	200	E-O	16, 3
NGC2023	2000	450	23,000, B1.5V	1000	E-O, C	100, 3
Horsehead	500	450	33,000, O9.5V	100	E-O	64, 3
IC63	100	230	30,000, B0.5IV	650	E-O, CG	16, 3
IC59	100	230	30,000, B0.5IV	480	E-O	16, 3
Ced201	100	420	10,500, B9.5V	200	F-O	16, 3
ρ Oph filament	500	160	22,000, B2V	400	E-O, C	16, 3
ρ Oph SR-3	500	160	13,000, B7	1000	S	16, 3
L1721	100	130	22,000, B2IV	10	E-O	150, 3
California	100	3500	37,000, O7	30	E-O	16, 3
vdb...			cold star			16, 3
Hot PDRs with H II regions		d (pc)	T_{eff}(K), star	G_0[6]	Geometry[7]	arcmin^2, N
Sh2-104, Cygnus		4000			Shell, F-O	800, 3
RCW 79		4300			Shell, F-O	1280, 3
RCW 82		2900			Shell, F-O	800, 3
RCW120		1200			Shell, F-O	960, 3
Pre-stellar cores		d (pc)	Mass			
L1544, Taurus		140				0, 3
L1521 E, Taurus		140				0, 3
L1521 F, Taurus		140				0, 3
L1689B, Ophiuchus		140				0, 3
Class 0 protostars		d (pc)	Mass			
IRAM04191, Taurus		140	Low			0, 3
IRAS16293, Ophiuchus		140	Intermediate			0, 3
N1333-IRAS4, Perseus		350	Intermediate			0, 3
N6334I(N), NGC6334		1700	High			0, 3
Class I protostars		d (pc)	Mass	mm env.		
IRAS04191, Taurus		140	Low	yes		0, 3
L1489-IRS, Taurus		140	Low	no		0, 3
EL29, Ophiuchus		140	Intermediate			0, 3
N6334I, NGC6334		1700	High			0, 3

Source	I_{100}[1]	A_V	Physical Properties			Obs[2].
Shock processed dust			n_H, H cm^{-3}	v, km s^{-1}	HI/CO[3]	deg^2, N
Spica H II	1-4	0.1	0.5	0	n/n	0.9, 0
IVC G86.5+59.6	1-2	0.1	10	-40	y/n	0.9, 0
Cirrus to Molecular Clouds			α[4]	f_{CO}[5]		
Ursa Major	4-8	< 1	100	0.	y/y	1.5, 0
Polaris flare	5-10	0.3-2	10	0.3	y/y	1.5, 0
G300-17/Cham III	8-18	1-3	2/5	0.1/1	n/y	1.3, 0
Taurus filament	10-20	1-3	1	1	n/y	0.75, 0
PDRs		d (pc)	T_{eff}(K), star	G_0[6]	Geometry[7]	arcmin^2, N
NGC7023	1000	440	17,000, B3Ve	1500	E-O	16, 3
NGC7023 E	200	440	17,000, B3Ve	200	E-O	16, 3
NGC2023	2000	450	23,000, B1.5V	1000	E-O, C	100, 3
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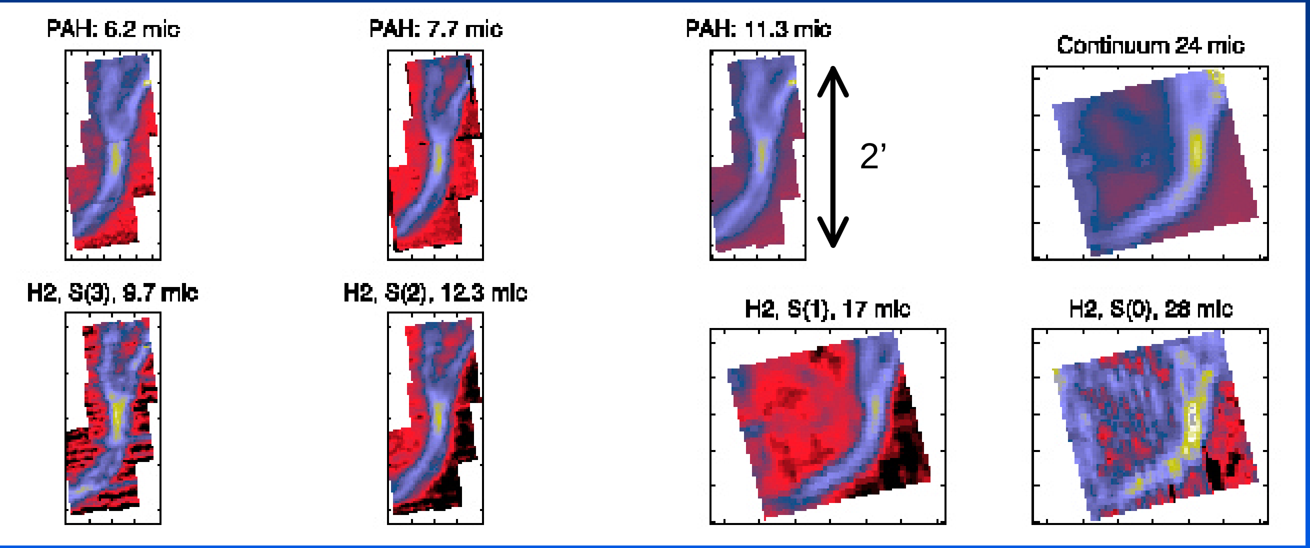
L1721	100	130	22,000, B2IV	10	E-O	150, 3
California	100	3500	37,000, O7	30	E-O	16, 3
vdb...			cold star			16, 3
Hot PDRs with H II regions		d (pc)	T_{eff}(K), star	G_0[6]	Geometry[7]	arcmin^2, N
Sh2-104, Cygnus		4000			Shell, F-O	800, 3
RCW 79		4300			Shell, F-O	1280, 3
RCW 82		2900			Shell, F-O	800, 3
RCW120		1200			Shell, F-O	960, 3
Pre-stellar cores		d (pc)	Mass			
L1544, Taurus		140				0, 3
L1521 E, Taurus		140				0, 3
L1521 F, Taurus		140				0, 3
L1689B, Ophiuchus		140				0, 3
Class 0 protostars		d (pc)	Mass			
IRAM04191, Taurus		140	Low			0, 3
IRAS16293, Ophiuchus		140	Intermediate			0, 3
N1333-IRAS4, Perseus		350	Intermediate			0, 3
N6334I(N), NGC6334		1700	High			0, 3
Class I protostars		d (pc)	Mass	mm env.		
IRAS04191, Taurus		140	Low	yes		0, 3
L1489-IRS, Taurus		140	Low	no		0, 3
EL29, Ophiuchus		140	Intermediate			0, 3
N6334I, NGC6334		1700	High			0, 3

SPECPDR
IRAC + MIPS mapping
IRS Spectral mapping
MIPS Spectral mapping

Some preliminary results of the SPECPDR program (Joblin et al.)
Spectral mapping of the Horsehead Nebula with IRS (5-40 µm)

1. Spectral maps



Habart et al. (in prep.)

– IRS: Evolution of PAHs and Very Small Grains, in relation with the physical Conditions

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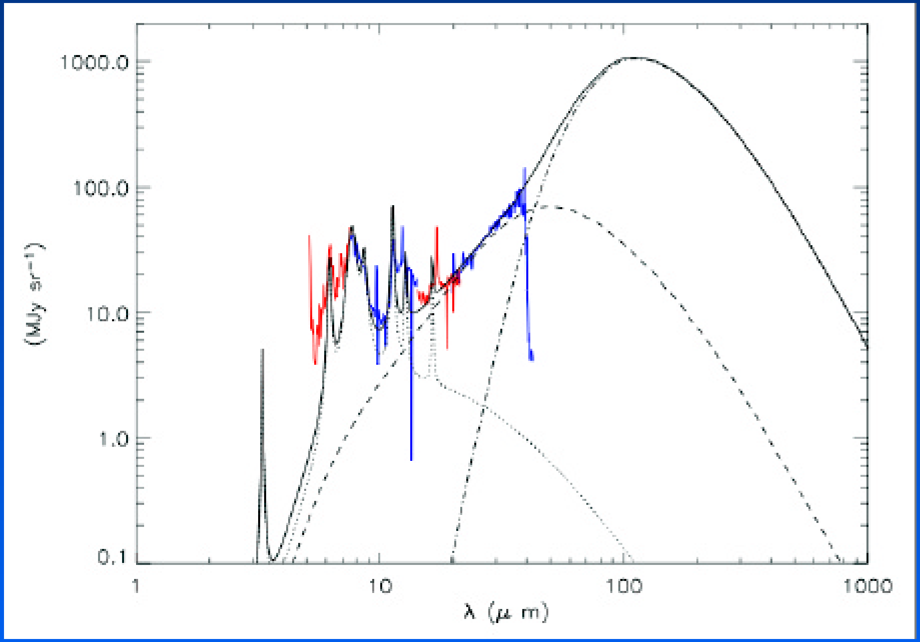
Spectral mapping of the Horsehead Nebula with IRS (5-40 µm)

2. Spectra and modelling (peak position)



Compiegne et al. (in prep.)

- IRS: Evolution of PAHs and Very Small Grains, in relation with the physical Conditions
  - Abundance variations across the PDR

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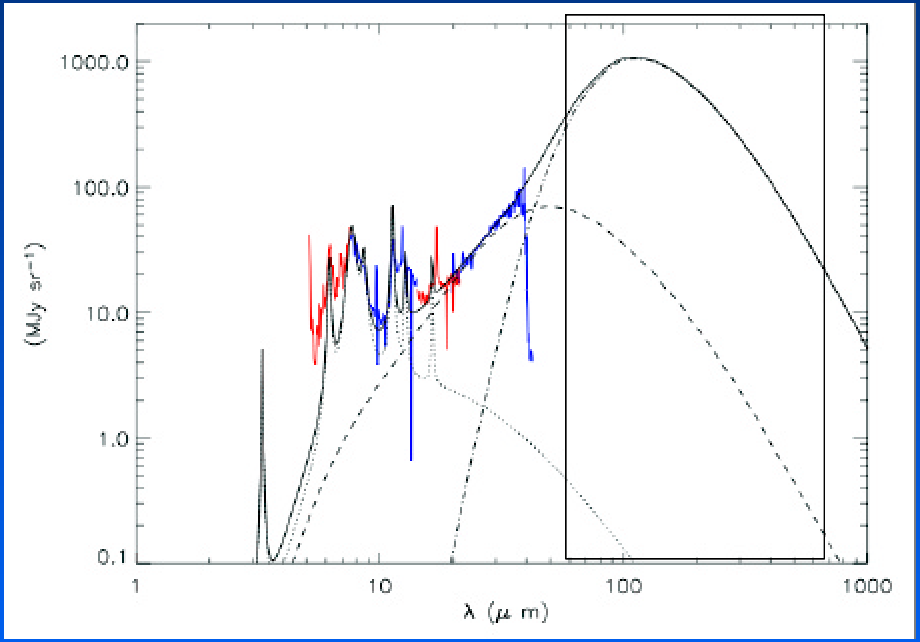

Compiegne et al. (in prep.)

- IRS: Evolution of PAHs and Very Small Grains, in relation with the physical Conditions
  - Abundance variations across the PDR
- SPIRE and PACS : Evolution of Large Grains and Very Small Grains + Main cooling lines

SAG 4: Collaborations with other GT KP

- PACS/CEA : Goult Belt PACS project: 16 hours of common time (Taurus and Polaris Flare)
- PACS/LAM : PACS spectroscopy of hot PDRs in SAG 3 (SAG 4 : SPIRE spectroscopy, same objects)
  - Common choice of the fields
  - The PACS data will be used by the SAG 4 members working on these two fields

- HIFI : The dense and warm interstellar medium, Ossenkopf et al.
  - Chemical and Dynamical structures of PDRs: not only the main lines
  - Actually 12 classical PDRs: 84 h. HIFI + 24 h. PACS
  - 5 sources common with SAG 4: Horsehead, NGC7023, IC 63, Ced 201, ρ Oph
    - In SAG 4: SPIRE (10 h LR-H R) + PACS (7.5 hours)
  - **We propose to put these 5 sources in top priority in both proposal (TBD)**
    - We agree to coordinate the observing strategy
    - Both projects request PACS spectroscopy
  - Data exchange
    - HIFI: need the continuum data
    - SAG 4: interested by the results from the HIFI observations (not the data)
    - SAG 4 could provide the SPIRE data, and HIFI the PACS data. TBD.

- HIFI : Pre-stellar cores and Protostars
  - In SAG 4: 15 hours SPIRE LR + 24 hours SPIRE HR (proto-stars)+ 12 hours HIFI (dense cores)
  - Water Key Project (van Dishoeck et al.) : HIFI : ortho and para H_2O, H_3O^+ lines
    - Source list not finalised: we agree to coordinate the list and the observing strategy (TBD)
    - Data exchange during the prioritary period?
  - Spectral Survey of YSOs (Ceccarelli et al.)
    - ?

SAG 4: data and publication rights

- Within SAG 4 : SPIRE constitution
  - Any member of the SAG have data right in accordance with their contribution to the project as a whole and the particular areas of science for which the data are to be used.
  - Co-authorship of any paper to which he/she has contributed.

- For the SAG 3-SAG 4 : 18 common hours
  - Agreement to exchange the corresponding data : no problem.

- PACS GT: 16 hours common also with SAG 3
  - Specific agreement with CEA/Saclay and SAG 3.

SAG 4: Preparation of the stage-3 proposal

- **Work on the source list :**
  - In coordination with the HIFI KP:
    - The dense and warm interstellar Medium (PDRs)
    - The Water and the Spectral Survey KPs
  - Also with PACS/CEA and SAG 3
  - Use the Spitzer results
- **Clarify the data exchange to be discussed with HIFI.**
- **Responsabilities for the production of data products.**

Reports from Co-I's and ICC Steering Group Meetings

Matt Griffin and Seb Oliver

Co-Is' Meeting

- **Funding situation: OK by our standards**

- **Clarification of rules for appointment of Associate Scientists and Consultants**

- **Revised Sience Team plan**
  - **Stage 3 proposals to be written (using new recommended format)**
  - **STAC Meeting 12/13 December**
  - **Final Stage-3 proposals STAC review   April 06**
  - **Ready for submission to ESA (the HOTAC)   June 06**
  - **Actual deadline   Sept. 06**

ICC Steering Group Meeting

- **Resources**
  - **More than ever before ~20 sy/year**
  - **Being used more effectively than before**
  - **ACTION: Ken/Mohai to continue Chinese experiment**
  - **ACTION: Laurent to provide summary of French resources in Oct.**
- **Bid for ESA workpackages**
  - **70-80 Staff Years in total**
  - **SPIRE biding for about 12**
  - **ACTION: Ken to circulate plan to Co-Is**
- **Review**
  - **Light touch review**
  - **Focus on AOTs, pipeline, data products**
  - **ACTION: Matt Griffin to draft review specs.**